Cell-mediated immunity may play an equal or more substantial role in the healing of these lesions, since T lymphocytes, predominantly of the CD8 subclass but also of the CD4 subclass, are found in the regressing lesions.

During the healing process, numerous cytokines, growth factors and immunologically active substances are present within the wound. Any of these factors may contribute towards producing systemic immunity and, hence, may be responsible for eliminating the virus from distant sites.

Our experience suggests not only that carbon-dioxide laser excision of refractory verrucae together with excision-site base cautery produces excellent local clearing of these warts but also that the process produces an unexpected boost in natural immunity to the HPV virus. The latter conclusion is speculative until prospective studies can be carried out using assays to measure pre-treatment and post-treatment immune status.

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Watch out for the K-wire: painful experiences in two cases

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SUMMARY. According to reviews in the literature, only a few case reports have mentioned the unusual migration of K-wires during orthopaedic surgery since 1991. This report emphasises the potential migration of the K-wire during plastic surgery in order to avoid the possible catastrophic complications. © 2002 The British Association of Plastic Surgeons. Published by Elsevier Science Ltd. All rights reserved.

Keywords: Kirschner wire, foreign-body migration.

In 1907, Fritz Steinmann used a single-ended pin for skeletal traction. In 1909, Martin Kirschner used a double-ended pin for skeletal traction,[1] and the 'K-wire' is still used today. K-wire fixation is widely used in patients with fractures of the clavicle,[2] the small bones of the foot and hand, and even the long bones, with very minor or no subsequent sequelae. At the Veterans General Hospital K-wire fixation is used for fractures of the facial bones and the small bones of the hand and foot. Since 1994, radial osteocutaneous flaps have been used for phalloplasty in female-to-male transsexual surgery, and K-wires have been used to provide temporary fixation to the pubic bone.[3] In 1999, I began using K-wire fixation for transblepharoplasty eyebrow lifts.[4]

Case reports

Case 1

A 36-year-old primary female-to-male transsexual, who had been certified by two psychiatrists to undergo surgery, was admitted for three-stage sex-reassignment surgery using a free radial osteocutaneous flap for phalloplasty in 1995. After completion of the surgery, there was a small urethrocutaneous fistula at the scroto-penile junction. During the 6 months following surgery the patient complained of occasional cramping pain over the left lower abdomen. In April 1996, the patient experienced a sudden onset of cramping epigastralgia associated with nausea and vomiting. The patient was sent to the emergency department for medical treatment. A plain abdominal radiograph showed a long K-wire (Fig. 1), which was thought to be located in the subcutaneous layer; however, an attempt to remove it under local anaesthesia failed. A general surgeon performed an explorative laparotomy under general anaesthesia. The K-wire was removed from the abdominal cavity without injuring any organs. The urethrocutaneous fistula was also repaired during this admission. The patient was discharged uneventfully, but a subsequent lawsuit was unavoidable.

Case 2

A 59-year-old woman underwent bilateral upper blepharoplasty and transblepharoplasty eyebrow lifts. Two K-wires were used

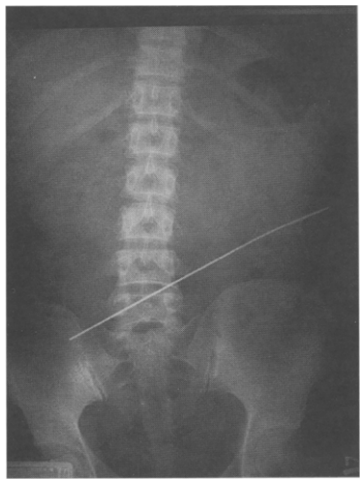

Figure 1—*Case 1.* A long K-wire in the abdominal cavity, seen on plain abdominal radiograph.

Figure 2—*Case 2.* A short K-wire in the left frontal region.

for 5 days to fix the skin to the frontal skull at the supraorbital ridge. On the fifth postoperative day, inward migration of the K-wire on the left side was noted. Removal of the K-wire was unsuccessfully attempted through the previous incision site. The K-wire moved deeper. The next day, intracranial migration of the K-wire was seen on roentgenological examination (Fig. 2). Emergent craniotomy to remove the foreign body and subsequent antibiotic administration for 6 weeks were required. The patient recovered uneventfully, but a medicolegal lawsuit was unavoidable.

Discussion

The clinical use of K-wires is still common. However, surgeons should be alert to the possibility of indiscriminate migration of the K-wire. Migration of K-wires into the lung, heart, pulmonary artery and spinal canal have all been reported.[5–11] Bending of the outer end of the K-wire is the easiest way to prevent deep migration. Avoiding osteosynthesis procedures near the vital organs and close follow-up radiographs to check the positions of the K-wires are also suggested. In addition, the patient should be warned of the possible complications preoperatively and postoperatively. Since the K-wire can be seen daily by the patient, he or she can monitor its position better than others can. Early intervention to prevent K-wire migration may be possible.

In case 1 no postoperative warnings were given because the staff thought the K-wire had been removed. In case 2 the patient also did not receive any warnings. Inward migration of the K-wire occurred when she used cold compression with ice cubes heavily over the operative area. Medicolegal lawsuits can be avoided by meticulous planning.

In conclusion, K-wire migration is easy to observe after orthopaedic surgery for osteosynthesis over the clavicle, acromion and humerus. However, K-wire migration is unusual in the field of plastic surgery. It is hoped that this report will help other surgeons to avoid similar complications.

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